

Application No. 09/893,998  
Response dated May 12, 2005  
Responsive to Notice of Non-Compliant Amendment dated April 18, 2005

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (cancelled)
  2. (currently amended) An illumination device ~~having~~ comprising:
    - [[~~-~~]] a light source;
    - [[~~-~~]] an optical ~~waveguide~~ fiber bundle;
    - [[~~-~~]] a coupling-in optical system which couples the light of said light source into a first end of said ~~waveguide~~ fiber bundle;
    - [[~~-~~]] a coupling-out optical system which couples out the light emerging from a second end of said optical ~~waveguide~~ fiber bundle; and
    - [[~~-~~]] an illuminating optical system which ~~receives the light emerging from said coupling-out optical system and~~ illuminates an image field; and field,
      - ~~comprising:~~
      - a) ~~an optical fiber bundle which is arranged as said optical waveguide;~~
- and
- [[b]] a homogenizing optical system which is arranged between said coupling-out optical system and said illuminating optical system, wherein said homogenizing optical system homogenizes the nonuniform intensity distribution in the image field of the light emerging from said optical fiber bundle,
  - [[c]] wherein said homogenizing optical system comprises a microhoneycomb condenser and a lens member which superimpose the exit opening of said fiber bundle in an intermediate image plane to form a homogeneous intermediate image, and

Application No. 09/893,998

Response dated May 12, 2005

Responsive to Notice of Non-Compliant Amendment dated April 18, 2005

wherein homogenization occurs in an intermediate image plane that is outside of an object, and is performed only by the homogenizing optical system.

3. (withdrawn) An illumination device having
- a light source (1);
  - an optical waveguide;
  - a coupling-in optical system (3) which couples the light of said light source (1) into a first end of said waveguide;
  - a coupling-out optical system (5) which couples out the light emerging from a second end of said optical waveguide; and
  - an illuminating optical system (17; 20) which receives the light emerging from said coupling-out optical system (5) and illuminates an image field,
- comprising:
- a) an optical fiber bundle (4) which is arranged as said optical waveguide;
- and
- b) a homogenizing optical system (6) which is arranged between said coupling-out optical system (5) and said illuminating optical system (17; 20), wherein said homogenizing optical system (6) homogenizes the nonuniform intensity distribution in the image field of the light emerging from said optical fiber bundle (4),
  - c) wherein the light of said light source (1) is picked off via said couplingin optical system (3) having a large numerical entrance aperture and is coupled into said optical fiber bundle (4).

4. (withdrawn) An illumination device having
- a light source (1);
  - an optical waveguide;

Application No. 09/893,998

Response dated May 12, 2005

Responsive to Notice of Non-Compliant Amendment dated April 18, 2005

- a coupling-in optical system (3) which couples the light of said light source (1) into a first end of said waveguide;

- a coupling-out optical system (5) which couples out the light emerging from a second end of said optical waveguide; and

- an illuminating optical system (17; 20) which receives the light emerging from said coupling-out optical system (5) and illuminates an image field,

comprising:

d) an optical fiber bundle (4) which is arranged as said optical waveguide; and

e) a homogenizing optical system (6) which is arranged between said coupling-out optical system (5) and said illuminating optical system (17; 20), wherein said homogenizing optical system (6) homogenizes the nonuniform intensity distribution in the image field of the light emerging from said optical fiber bundle (4),

f) wherein the light of said light source (1) is picked off via said coupling in optical system (3) having a large numerical entrance aperture  $NA \geq 0.60$  and is coupled into said optical fiber bundle (4).

5. (currently amended) A coordinate measuring instrument ~~having~~ comprising:

[[ - ]] a horizontally X-Y displaceable measurement stage for receiving a substrate with a feature that is to be measured;

[[ - ]] an illumination system ~~with~~ including

a light source,

an optical ~~waveguide~~ fiber bundle,

a coupling-in optical system before the optical ~~waveguide~~ fiber bundle.

Application No. 09/893,998

Response dated May 12, 2005

Responsive to Notice of Non-Compliant Amendment dated April 18, 2005

a coupling-out optical system after the optical waveguide fiber bundle,  
and

an illuminating optical system for illuminating an image field, and  
field

a homogenizing optical system which is arranged between said coupling-out optical system and said illuminating optical system, said homogenizing optical system homogenizes the nonuniform intensity distribution in the image field of the light emerging from the optical fiber bundle; and

[[ - ]] a detector device for determining the values of X and Y coordinates  
position of the feature within the X-Y displaceable measurement stage, feature, comprising:

a) ~~an optical fiber bundle which is arranged as said optical waveguide;~~  
and

b) ~~a homogenizing optical system which is arranged between said coupling-out optical system and said illuminating optical system, said homogenizing optical system homogenizes the nonuniform intensity distribution in the image field of the light emerging from the optical fiber bundle.~~

6. (currently amended) A coordinate measuring instrument ~~having~~ comprising:

[[ - ]] a horizontally X-Y displaceable measurement stage for receiving a  
substrate with a feature that is to be measured;

[[ - ]] an illumination system with including

a light source,

an optical waveguide fiber bundle,

a coupling-in optical system before the optical waveguide fiber bundle.

Application No. 09/893,998

Response dated May 12, 2005

Responsive to Notice of Non-Compliant Amendment dated April 18, 2005

a coupling-out optical system after the optical waveguide fiber bundle,  
and

an illuminating optical system for illuminating an image field and  
field

a homogenizing optical system which is arranged between said coupling-out optical system and said illuminating optical system, said homogenizing optical system homogenizes the nonuniform intensity distribution in the image field of the light emerging from the optical fiber bundle, said homogenizing optical system comprising a micro-honeycomb condenser and a lens member which superimpose the exit opening of the fiber bundle in an intermediate image plane to form a homogeneous intermediate image; and

[[ - ]] a detector device for determining the values of X and Y coordinates position of the feature within the X-Y displaceable measurement stage, ~~feature, comprising:~~

a) ~~an optical fiber bundle which is arranged as said optical waveguide;~~  
and

b) ~~a homogenizing optical system which is arranged between the coupling-out optical system and the illuminating optical system, said homogenizing optical system homogenizes the nonuniform intensity distribution in the image field of the light emerging from the optical fiber bundle, said homogenizing optical system comprising a micro-honeycomb condenser and a lens member which superimpose the exit opening of the fiber bundle in an intermediate image plane to form a homogeneous intermediate image.~~

7. (withdrawn) A coordinate measuring instrument having

- a horizontally X-Y displaceable measurement stage (26) for receiving a substrate with a feature (31) that is to be measured;

- an illumination system with a light source (1), an optical waveguide (4), a coupling-in optical system (3) before the optical waveguide (4), a coupling-out optical system (5) after the optical waveguide (4), and an illuminating optical system (17; 20) for illuminating an image field; and

Application No. 09/893,998

Response dated May 12, 2005

Responsive to Notice of Non-Compliant Amendment dated April 18, 2005

- a detector device (14) for determining the position of the feature, comprising:

a) an optical fiber bundle (4) which is arranged as said optical waveguide;

b) a homogenizing optical system (6) which is arranged between said coupling-out optical system (5) and said illuminating optical system (17; 20), said homogenizing optical system (6) homogenizes the nonuniform intensity distribution in the image field of the light emerging from the optical fiber bundle (4).

c) wherein the light of said light source (1) is picked off via said coupling in optical system (5) with a large numerical entrance aperture, and is coupled into said optical fiber bundle (4).

8. (withdrawn) A coordinate measuring instrument having

- a horizontally X-Y displaceable measurement stage (26) for receiving a substrate with a feature (31) that is to be measured;

- an illumination system with a light source (1), an optical waveguide (4), a coupling-in optical system (3) before the optical waveguide (4), a coupling-out optical system (5) after the optical waveguide (4), and an illuminating optical system (17; 20) for illuminating an image field; and

- a detector device (14) for determining the position of the feature, comprising:

a) an optical fiber bundle (4) which is arranged as said optical waveguide;

d) a homogenizing optical system (6) which is arranged between said coupling-out optical system (5) and said illuminating optical system (17; 20), said homogenizing optical system (6) homogenizes the nonuniform intensity distribution in the image field of the light emerging from the optical fiber bundle (4).

Application No. 09/893,998  
Response dated May 12, 2005  
Responsive to Notice of Non-Compliant Amendment dated April 18, 2005

e) wherein the light of said light source (1) is picked off via said coupling in optical system (5) with a large numerical entrance aperture  $NA \geq 0.60$ , and is coupled into said optical fiber bundle (4).

9-12. (cancelled)